

WHAT IS CLAIMED IS:

1 1. A monolithic microwave integrated circuit, comprising:
2 an amplifier circuit having a group delay variation verses frequency
3 characteristic; and
4 a group delay equalizer circuit integrated with said amplifier circuit to
5 compensate for said group delay variation verses frequency characteristic of said amplifier
6 circuit.

1 2. The circuit of Claim 1, wherein said amplifier circuit is capable of receiving an
2 input signal having a frequency range, amplifying said input signal and producing an output
3 signal corresponding to said amplified input signal, said group delay equalizer circuit being
4 further capable of maintaining near constant group delay of frequencies within said frequency
5 range of said input signal to prevent distortion of said output signal.

1 3. The circuit of Claim 1, wherein said group delay equalizer circuit comprises
2 between 3 and 20 percent of the area of said monolithic microwave integrated circuit.

1 4. The circuit of Claim 1, wherein said group delay equalizer circuit is capable of
2 compensating for said group delay variation verses frequency characteristic of said amplifier
3 circuit to frequencies above 50 GHz.

1 5. The circuit of Claim 1, wherein said amplifier circuit is a distributed amplifier
2 circuit.

1 6. The circuit of Claim 5, wherein said distributed amplifier circuit comprises one
2 or more stages, each of said one or more stages including a common source field-effect
3 transistor, a bipolar transistor or a cascode field-effect transistor structure.

1 7. The circuit of Claim 1, wherein said amplifier circuit is a feedback amplifier
2 circuit.

1 8. The circuit of Claim 1, wherein said group delay equalizer circuit comprises
2 one or more sections, each of said sections having a different group delay response.

1 9. The circuit of Claim 8, wherein at least one of said one or more sections is
2 placed at the input of said amplifier circuit.

1 10. The circuit of Claim 8, wherein at least one of said one or more sections is
2 placed at the output of said amplifier circuit.

1 11. The circuit of Claim 8, wherein at least one of said one or more sections is
2 placed between one or more stages of said amplifier circuit.

1 12. The circuit of Claim 8, wherein said one or more sections are cascaded
2 together to form a composite group delay response capable of compensating for said group
3 delay variation verses frequency characteristic of said amplifier circuit.

1 13. The circuit of Claim 8, wherein at least one of said one or more sections has
2 least one microstrip line inductive over a specific frequency range and at least one capacitor to
3 create a specific phase response over at least a portion of the frequency range of said amplifier
4 circuit.

1 14. The circuit of Claim 13, wherein at least one of said one or more sections is a
2 filter selected from the group consisting of: an LC filter, a bridged LC filter, an RC filter and
3 an RLC filter.

1 15. The circuit of Claim 13, wherein at least one of said one or more sections is a
2 filter with a microstrip transformer.

1 16. The circuit of Claim 1, further comprising:
2 a substrate, said amplifier circuit and said group delay equalizer circuit being
3 fabricated in said substrate.

1 17. The circuit of Claim 16, wherein said substrate is made from a material selected
2 from the group consisting of: a III-V material, a II-VI material and a heterostructure material.

1 18. The circuit of Claim 1, wherein said group delay equalizer circuit is further
2 capable of allowing a near constant gain response to be achieved over the frequency range of
3 said amplifier circuit.

1 19. A method for providing a near constant group delay over a frequency range of
2 a amplifier circuit, comprising the steps of:

3 providing said amplifier circuit within a monolithic microwave integrated
4 circuit, said amplifier circuit having a group delay response variation verses frequency
5 characteristic; and

6 integrating a group delay equalizer circuit with said amplifier circuit on said
7 monolithic microwave integrated circuit to compensate for said group delay variation verses
8 frequency characteristic of said amplifier circuit.

1 20. The method of Claim 19, further comprising the steps of:
2 receiving an input signal having a frequency range at said amplifier circuit;
3 amplifying said input signal to produce an output signal corresponding to said
4 amplified input signal; and
5 maintaining, by said group delay equalizer circuit, near constant group delay of
6 frequencies within said frequency range of said input signal to prevent distortion of said output
7 signal.

1 21. The method of Claim 19, wherein said group delay equalizer circuit comprises
2 between 3 and 20 percent of the area of said monolithic microwave integrated circuit.

1 22. The method of Claim 19, wherein said step of integrating further comprises the
2 step of:
3 compensating, by said group delay equalizer circuit, for said group delay
4 variation verses frequency characteristic of said amplifier circuit to frequencies above 50 GHz.

1 23. The method of Claim 19, wherein said step of integrating further comprises the
2 step of:

3 integrating one or more sections of said group delay equalizer circuit with said
4 amplifier circuit on said monolithic microwave integrated circuit, each of said sections having
5 a different group delay response.

1 24. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 placing at least one of said one or more sections at the input of said amplifier
4 circuit.

1 25. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 placing at least one of said one or more sections at the output of said amplifier
4 circuit.

1 26. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 placing at least one of said one or more sections between one or more stages of
4 said amplifier circuit.

1 27. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:
3 cascading said one or more sections together to form a composite group delay
4 response capable of compensating for said group delay variation verses frequency
5 characteristic of said amplifier circuit.

1 28. The method of Claim 19, wherein said step of integrating further comprises the
2 step of:
3 integrating said group delay equalizer circuit with said amplifier circuit on said
4 monolithic microwave integrated circuit to allow a near constant gain response to be achieved
5 over the frequency range of said amplifier circuit.